

## CLAIMS

What is claimed is:

1           1. A power converter comprising:  
2           a shared first-side stage to receive an input;  
3           a plurality of second-side converter stages coupled to the first-side stage,  
4 each of second-side converter stages to generate an output; and  
5           control circuitry to monitor the outputs of the second-side converter stages  
6 and generate a control signal for each output, wherein the control signal turns off  
7 switching elements of a corresponding one of the second-side converter stage to  
8 regulate the output.

1           2. The power converter of claim 1 further comprising:  
2           a switching signal generator to generate a switching signal for switching  
3 on and off elements of the first-side stage, and switching on and off switching  
4 elements of the plurality of second-side converter stages;  
5           a plurality of second-side driver circuits, each to provide one of the  
6 second-side converter stages with a combined signal corresponding with the  
7 switching signal and one of the control signals, the second-side driver circuit  
8 turning off switching elements of the second-side stages in response to the one  
9 control signal.

1           3. The power converter of claim 2 wherein the second-side converter  
2 stages each comprise a transformer and a set of second-side switching elements  
3 which are alternatively turned on and off in response to the switching signal from  
4 a corresponding second-side driver circuit, the second-side switching elements  
5 being turned off based on the control signal to regulate the output.

1           4. The power converter of claim 3 wherein the switching signal has a duty  
2 cycle of up to 50%, and the combined signal has a duty cycle of less than the  
3 switching signal depending on the control signal.

1           5. The power converter of claim 2 wherein the first-side stage comprises  
2 first and second switching elements which are alternatively switched on and off,  
3 and wherein the plurality of second-side stages comprise a first and a second  
4 second-side stage, the first second-side stage comprising third and fourth  
5 switching elements which are alternatively switched on and off, the second  
6 second-side stage comprising fifth and sixth switching elements which are  
7 alternatively switched on and off.

1           6. The power converter of claim 5,  
2 wherein the switching signal turns on the first, third and fifth switching  
3 elements at substantially the same time,  
4 wherein the combined signal associated with the first second-side stage  
5 turns off the third switching element before the switching signal turns off the first  
6 switching element,  
7 wherein the combined signal associated with the second second-side stage  
8 turns off the fifth switching element before the switching signal turns off the first  
9 switching element.

1           7. The power converter of claim 6 further comprising:  
2 a first steering diode to inhibit current from flowing from the first to the  
3 second second-side stage when the third switching element is turned off before the  
4 fifth switching element and while the first switching element is conducting; and  
5 a second steering diode to inhibit current from flowing from the second to  
6 the first second-side stage when the fifth switching element is turned off before  
7 the third switching element and while the first switching element is conducting.

1           8. The power converter of claim 7 further comprising:  
2 a freewheeling diode associated with each of the third, fourth, fifth and  
3 sixth switching elements to allow transformer inductive leakage current to flow  
4 when the associated switching element is turned off.

1           9. The power converter of claim 1 wherein the shared first-side stage is a  
2 high side stage to receive an input voltage that is greater than an output voltage,  
3 and the plurality of second-side stages are low-side stages.

1           10. The power converter of claim 1 wherein the shared first-side stage is a  
2 low-side stage to receive an input voltage that is lower than an output voltage, and  
3 the plurality of second side stages are high-side stages.

1           11. A power converter comprising:  
2           a single set of high-side switching elements;  
3           a plurality of sets of low-side switching elements coupled to the high-side  
4 switching elements; and  
5           control circuits to turn off the low side switching elements of at least one  
6 of the sets before the high side switching elements to regulate an output.

1           12. The power converter of claim 11 further comprising:  
2           steering diodes coupling the low-side switching elements with the high-  
3 side switching elements, the steering diodes allowing current to flow from the  
4 high-side switching elements to the low-side switching elements, the steering  
5 diodes inhibiting current from flowing between the sets of low-side switching  
6 elements.

1           13. The power converter of claim 12 wherein each switch of the low-side  
2 sets has a corresponding one of the steering diodes.

1           14. The power converter of claim 11 further comprising:  
2           a freewheeling diode associated with each switch of the low-side sets, the  
3 freewheeling diodes allowing leakage current to flow from one of a plurality of  
4 transformers when the associated switch it turned off.

1           15. The power converter of claim 11 wherein an input current is split  
2 between the sets of low-side switching elements after flowing through one of the  
3 high-side switching elements, the split based on output loading of the sets of low-  
4 side switching elements.

1           16. The power converter of claim 11 further comprising:  
2           a switching signal generator to generate switching signals for the high-side  
3 and low-side switching elements;  
4           a plurality of low-side control circuits each associated with one of the sets  
5 of low-side switching elements, each low-side control circuit to monitor one of a

6 plurality of outputs and to generate a control signal to change a duty-cycle of the  
7 low-side switching elements of the associated set.

1 17. The power converter of claim 16 further comprising:  
2 a low-side driver circuit for each set of low-side switching elements, the  
3 low-side driver circuits to provide switching signals to the low-side switching  
4 elements based on the switching signals from the switching signal generator and  
5 one of the control signals, wherein low-side driver circuit, based on the control  
6 signal from the associated control circuit, changes the duty cycle of the switching  
7 signal provided by the low-side driver circuit to the low-side switching elements  
8 to regulate an associated output.

1 18. The power converter of claim 17 wherein when a first switch of a first  
2 set of low-side switching elements is turned off before a second switch of a  
3 second set of low-side switching elements, a steering diode associated with the  
4 first switch inhibits current from flowing from a transformer associated with the  
5 first set of low-side switching elements to a transformer associated with the  
6 second set of low-side switching elements.

1 19. The power converter of claim 17 further comprising an optical coupler  
2 to electrically isolate the low-side control circuit from the low-side driver  
3 circuitry.

1 20. The power converter of claim 11 further comprising a plurality of  
2 transformers, each transformer associated with one of the sets of the low-side  
3 switching elements to generate one of a plurality of outputs.

1 21. A method comprising:  
2 generating a pulse width modulated switching signal;  
3 switching input current through switching elements of a high-side stage in  
4 response to the switching signal;

5           switching a first portion of the input current through switching elements of  
6   a first low-side stage in response to a first control signal and the switching signal;  
7   and  
8           monitoring an output of the first low-side stage to generate the first control  
9   signal, the first control signal turning off the switching elements of the first low-  
10   side stage to regulate the output.

1           22. The method of claim 21 further comprising:  
2           switching a second portion of the input current through switching elements  
3   of a second low-side stage in response to a second control signal and the switching  
4   signal; and  
5           monitoring an output of the second low-side stage to generate the second  
6   control signal, the second control signal turning off the switching elements of the  
7   second low-side stage to regulate the output of the second low-side stage.

1           23. The method of claim 22 further comprising inhibiting current from  
2   flowing between the first and second low-side stages when the switching elements  
3   of one of the low-side stages is turned off before the other.

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